

Malnutrition in elementary rural schools in the municipality of Paso de Ovejas, Veracruz, Mexico

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ABSTRACT

Objective: To assess malnutrition in elementary education students from four rural schools in the municipality of Paso de Ovejas, Veracruz, Mexico.

Methodology: The study is based on the participatory action research process (PAR), a descriptive, analytical, non-experimental, and cross-sectional methodology. The body mass index (BMI) of 617 children and teenagers was measured through an anthropometric assessment. To determine malnutrition, the 2007 World Health Organization report which measures BMI according to gender and age was taken as reference.

Results: Forty-seven percent of the students have a normal nutritional status. Among the rest of the student population, the problem of malnutrition is prevalent, with 43% being overweight or obese. Malnutrition in its three levels (mild, moderate, and severe) had an impact on 10% of the population, with girls being the most frequently affected.

Implication: The study does not present dietary surveys nor students' medical histories. Still, anthropometry is a method validated by WHO.

Findings: Nutritional problems —such as overweight, obesity, and malnutrition— were observed in 53% of the students. Therefore, it is necessary to implement strategies that follow a participatory model and to develop a nutritional education program based on the “territorial food system”. This will foster respect for the local culture and encourage the co-design of school and/or family kitchen gardens through agro-ecopedagogy.

Keywords: Natural resources, Food culture, Agro-ecopedagogy.



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INTRODUCTION

The Food and Agriculture Organization of the United Nations (FAO, 2014) defines malnutrition as the abnormal physiological condition caused by an unbalanced (insufficient or excessive) intake of macronutrients (carbohydrates, proteins, and fats) and micronutrients (vitamins and minerals), which are essential for growth and physical and cognitive development in human beings (FAO, 2014, p. 1). Malnutrition and overweight are consequently linked to food insecurity (Rodríguez *et al.* 2018). These nutritional problems constitute a major public health challenge, in particular obesity, which has been declared a global pandemic. Moreover, in its report on food and nutrition security, FAO (2019) points out that no region is free of overweight and obesity, as a consequence of the consumption of food with little nutritional value. Children of elementary school age constitute the most vulnerable population (FAO, FIDA, OMS, PMA, and UNICEF, 2019).

According to the Instituto Nacional de Salud Pública (INSP) and UNICEF Mexico (2016), malnutrition has a severely negative impact on the quality of life and life expectancy of children and teenagers. Child malnutrition (short stature and an inadequate development of the immune system) can be observed in the southern states of Mexico, mostly in rural communities where indigenous households are the most vulnerable. Meanwhile, overweight and obesity are prevalent in urban communities of the northern states, which puts children at risk of developing diabetes, as well as circulatory, heart or kidney problems (INSP and UNICEF, 2016). Mexico ranks first in child obesity worldwide. The most recent records indicate that 33.2% of children between 6 and 11 years old are overweight and/or obese, while 36.3% of teenagers between 12 and 19 years of age have this same problem (ENSANUT, 2016).

All this seems to confirm that there is a deficient use of natural resources or a lack of knowledge regarding high protein value food that children must and can include in their diet (Burgess and Dean, 1963). Although Mexico is a megadiverse country with a high number of native species and ecosystems (CONABIO, 2008), its children and teenagers continue to present nutritional deficiencies (overweight and obesity) (ENSANUT, 2012). This situation also holds true for the state of Veracruz, which is located in a geographical environment rich in natural resources.

This overview shows that malnutrition is a serious problem that endangers the survival and health of child population in this area, and also that the implementation of public food policies that seek to attain food security have not reached their goals so far. Corzo (2020) observes that successful policies have two basic characteristics: 1) objectives informed by public interest; and 2) a basis in research processes that involve the use of methodology. It is important to make a timely and appropriate diagnosis, one that provides useful results for the design of strategies that may reduce malnutrition and food problems and help fulfill the goals of governmental interventions. In order to understand the issue at hand on a local level, we evaluated malnutrition among elementary education students in four rural schools in the municipality of Paso de Ovejas, Veracruz, Mexico.

MATERIALS AND METHODS

This research is based on the participatory action research process (Balcazar, 2003), a descriptive, analytical, non-experimental, and cross-sectional methodology. The study was carried out with the participation of four elementary schools located in the rural communities of Puente Jula, Plan de Manantial, Bandera de Juárez, and Cerro Guzmán, all of them located in the municipality of Paso de Ovejas, Veracruz. We worked with an enrollment of 617 students, including 6- to 12-year-old boys and girls from first to sixth grades, and 12- to 15-year-old teenagers from first to third grade of secondary school.

To determine the nutritional status, an anthropometric assessment was carried out in coordination with trained personnel from the Facultad de Nutrición of the Universidad Veracruzana. The children's physical dimensions were measured to obtain their BMI with the following formula: $BMI = \text{Weight (kg)} / [\text{Height (m)}]^2$ (Kaufner and Toussaint, 2008). The nutritional status classification indicators are: normal, overweight, obesity, mild malnutrition, moderate malnutrition, and severe malnutrition (OMS, 2007; quoted in FANTA, 2013, p. 6, 7). These indicators were obtained by comparing the BMI results with the scale proposed by the World Health Organization in 2007, specifically for girls and boys aged 6 to 18 years old. Data were managed using Microsoft Office Excel 2016, with descriptive statistics of the variables considered in the study. Subsequently, numerical and percentage results were generated, along with comparative graphics.

RESULTS AND DISCUSSION

The 617 students were distributed according to their gender (51% male and 49% female). In three of the schools, the disparity between both genders is minimal, while in the Úrsulo Galván elementary school there is a higher prevalence of boys. It is important to note that education is not only a right, but also a fundamental asset to promote health care among students (both male and female), since it encourages access to information, development of skills, and empowerment (De Vincezi and Tedesco, 2009, p.1). However, the education of women brings about the benefit of better care for families, since educated women can champion proper hygiene and a healthy diet (Hill and King, 1955, p.25).

After assessing the state of malnutrition, the results were classified into the following categories: normal, overweight, obesity, mild malnutrition, moderate malnutrition, and severe malnutrition. The normal indicator has a frequency of 294 cases (Figure 1) that correspond to 48% of the total population evaluated. Normal weight had a majority distribution of 27% among boys and 21% among girls. The highest incidence of normal weight was registered in boys and 6-, 7-, 9-, and 13-year-old girls.

According to these results, more than 50% of the children present malnutrition problems; therefore, cases with overweight, obesity, and malnutrition indicators should be kept in mind. A good immune system should be the mark of the early years of life, increasing the chances of child survival and protecting a person throughout their life. Therefore, keeping a balanced diet and exercising are important for health care, since this combination creates a "state of complete well-being: physical, mental, and social" (UNICEF, 2019, p.14).

Regarding the overweight indicator (Figure 2), 167 cases (27%) were observed, 99 of which correspond to girls (16%) and 68 to boys (11%). At the Tomasa Valdés Viuda de

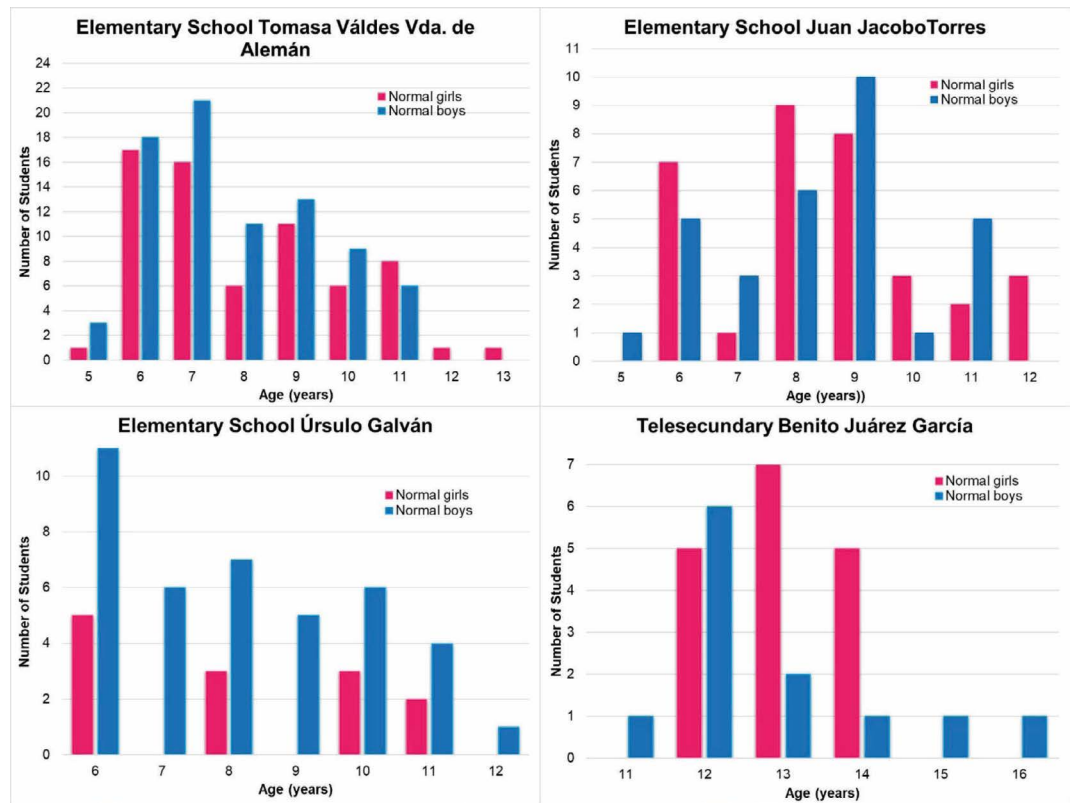


Figure 1. Distribution of students with normal indicator according to age and gender.

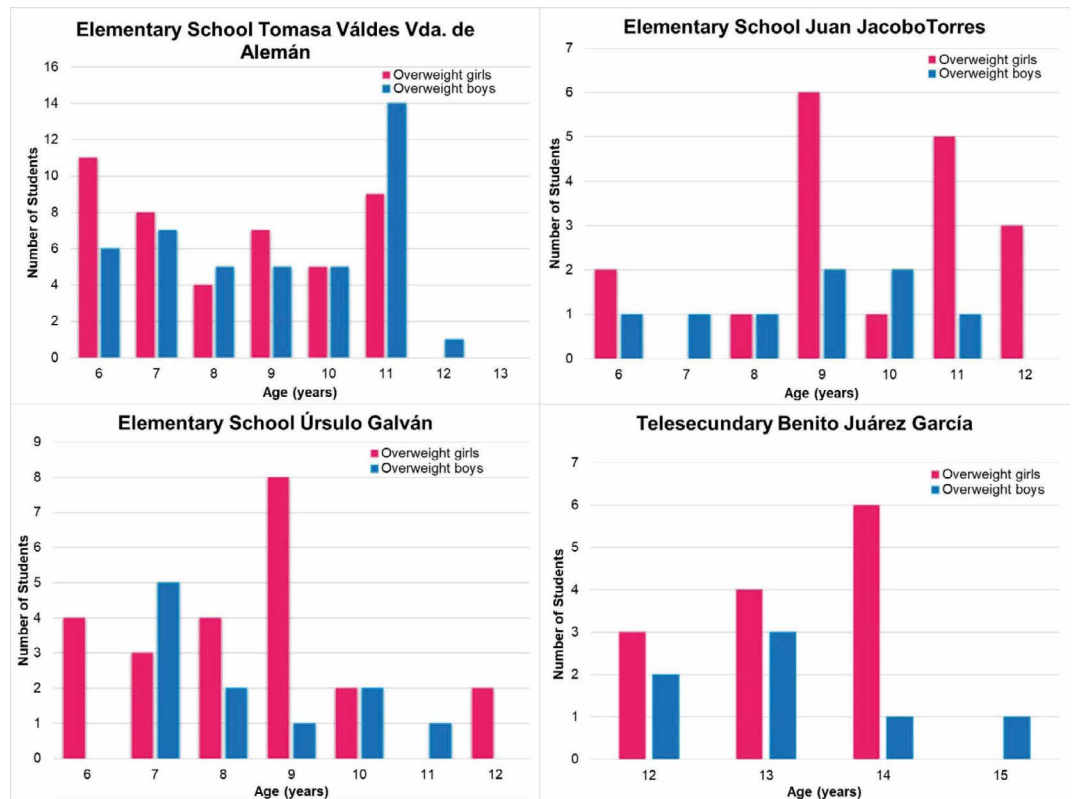


Figure 2. Distribution of students with overweight problems according to age and gender.

Alemán elementary school there were 87 cases (14%), with a minimal difference between both genders. Overweight mainly affected girls aged 6, 9, 11, and 14, and 11-year-old boys in the other three elementary schools.

Similarly, Hernández *et al.* (2003) observed that the greatest risk of presenting overweight and obesity was found particularly among girls; the factors associated with this nutrition problem were socioeconomic level, age of students, and their mothers' education level. Nevertheless, a low level of physical activity and a sedentary lifestyle, coupled with poor eating habits, are both determinants of overweight and obesity. This health problem occurs more frequently when both mother and father present overweight (Pérez-Villagrán *et al.*, 2010). Consequently, overweight is the main nutritional problem in schools and, if left unchecked, it will lead to obesity.

The results of our research match the assessment study on overweight/obesity among school-aged children conducted by Machado *et al.* (2018), who point out that 28.3% of children were overweight, while 14.5% were obese. This shows that the prevalence of overweight/obesity has grown in Latin America and the Caribbean, increasingly affecting younger children (Machado *et al.*, 2018).

Regarding the obesity indicator, there were 97 cases in all four schools —16% of the total student population—, with a 9% prevalence frequency in boys (Figure 3). We must emphasize that the Tomasa Valdés Viuda de Alemán elementary school accounts for

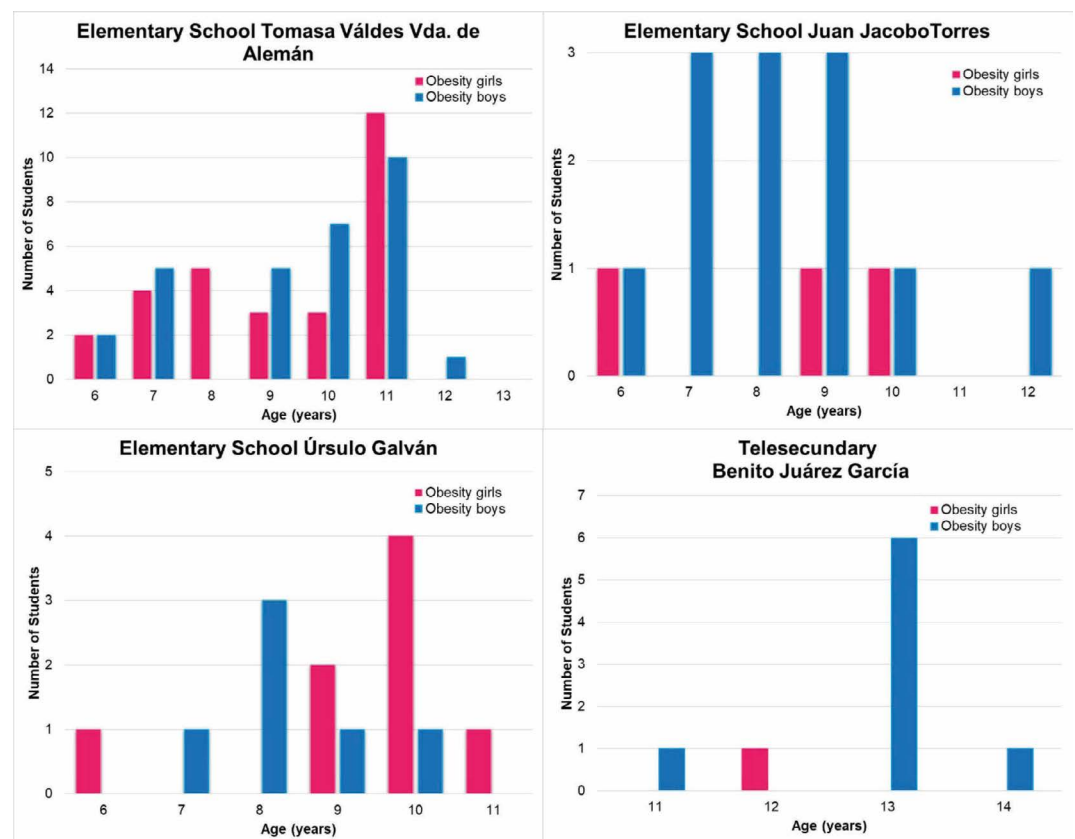


Figure 3. Distribution of students with obesity problems according to age and gender.

9.6% of the total cases —with a higher frequency among boys, although the difference between both genders is minimal. This problem had a higher incidence among boys and girls aged 10 and 11. According to the Instituto Nacional de Salud Pública (INSP), obesity has prevailed for more than two decades, and children between five and eleven years old are the most vulnerable population. Moreover, the INSP reports a higher increase in boys (77%) than in girls (47%); according to these results, taking preventive measures to control obesity among schoolchildren is urgent (INSP, 2006).

Consequently, obesity has given rise to a growing public health problem worldwide. It is considered a chronic, complex, and multifactorial disease that starts in childhood and/or adolescence (Machado, *op cit*). The Secretaría de Salud (SSA) points out that the origin of this disease may be endogenous (a series of problems caused by the dysfunction of an endocrine gland) or exogenous (excessive food intake or a sedentary lifestyle, among other factors). The latter is true for 90-95% of all obesity cases, which means that most of the individuals who suffer from it have an inadequate diet and/or lifestyle (SSA, 2010, p.1). The seriousness of this problem is on the rise, since the number of children and teenagers (from 5 to 19 years of age) who present obesity has multiplied by 10 during the last four decades. In a study carried out side by side with the Imperial College of London, the World Health Organization points out that, if current trends continue, in 2022 there will be more obese than moderately or severely underweight children and teenagers (OMS, 2017). Certainly, this situation must be addressed as soon as overweight is detected, because obesity in the early stages of life constitutes a significant health risk and may lead to medical, psychological, and social problems that affect both the quality of life and life expectancy (Castañeda *et al.*, 2016).

During our fieldwork, one of the first particulars we observed in the Tomasa Valdés Viuda de Alemán elementary school was an excessive intake of high caloric content food with low nutritional content (“junk food”) among children. This “junk food” is purchased inside the school or delivered by parents during recess time. Therefore, it is important to curb their consumption, since these foods are a triggering factor for overweight and obesity. This problem will be inevitable as long as children have access to junk food at home and even at school. This situation prevails even though in Mexico these foods are regulated through product labeling. It has also been reported that such products are low in micronutrients and high in fat, sugars, and energy content; nevertheless, they are among the most advertised products for children (Velasco, 2016, p.6). We might assume that people know what child obesity is and understand the problems and consequences it brings; however, obesity and a sedentary lifestyle prevail in many households. Despite this awareness, families have not modified their eating patterns; such a change is very important to prevent chronic-degenerative diseases, including diabetes, hypertension, dyslipidemia, and atherosclerosis (Ruvalcaba *et al.*, 2018).

Various studies indicate that poor eating habits and a sedentary lifestyle lead to overweight and obesity. However, a second important particular that must be observed is that, in the municipality of Paso de Ovejas (like in the whole state of Veracruz), serious public security problems prevent children from engaging in physical activity outside the school. Fajardo (2012) mentions that, as a consequence of this same problem, children

spend several hours in front of the TV, a computer, a tablet, or a cellphone, and their chances of performing physical activities (sports or recreational) are therefore diminished. Additionally, she considers other factors such as low income, parents' fear of insecurity and violence in streets and parks, or just a way of life that prevents children from expending more energy (Fajardo, 2012).

Although with less frequency, the malnutrition indicator was present in all four schools, with a total of 59 cases (9.56%): 40 of mild malnutrition, mainly in girls; 11 of moderate malnutrition, with a higher incidence in boys; and 8 of severe malnutrition, with girls being the most vulnerable group (Figure 4). The Tomasa Valdés Viuda de Alemán school showed the highest percentage of mild, moderate, and severe malnutrition, followed by the Juan Jacobo Torres elementary school, with mild and moderate malnutrition problems, as well as the Telesecundaria Benito Juárez García. The Úrsulo Galván elementary school had a lower number of cases, mainly related to mild malnutrition. Similar results were obtained in a municipality of Bolivia, where the prevalence of malnutrition was observed mainly in schoolchildren aged 5 to 14. This is a serious problem, since the psychomotor and intellectual development of these children is directly affected (Mamani *et al.*, 2013).

These results indicate that malnutrition is still present in the rural areas of central Veracruz, and so is the increase in the rates of overweight and obesity. Therefore, there is a serious malnutrition problem (Velasco, *op. cit.*), which means that 30-year-old ailments

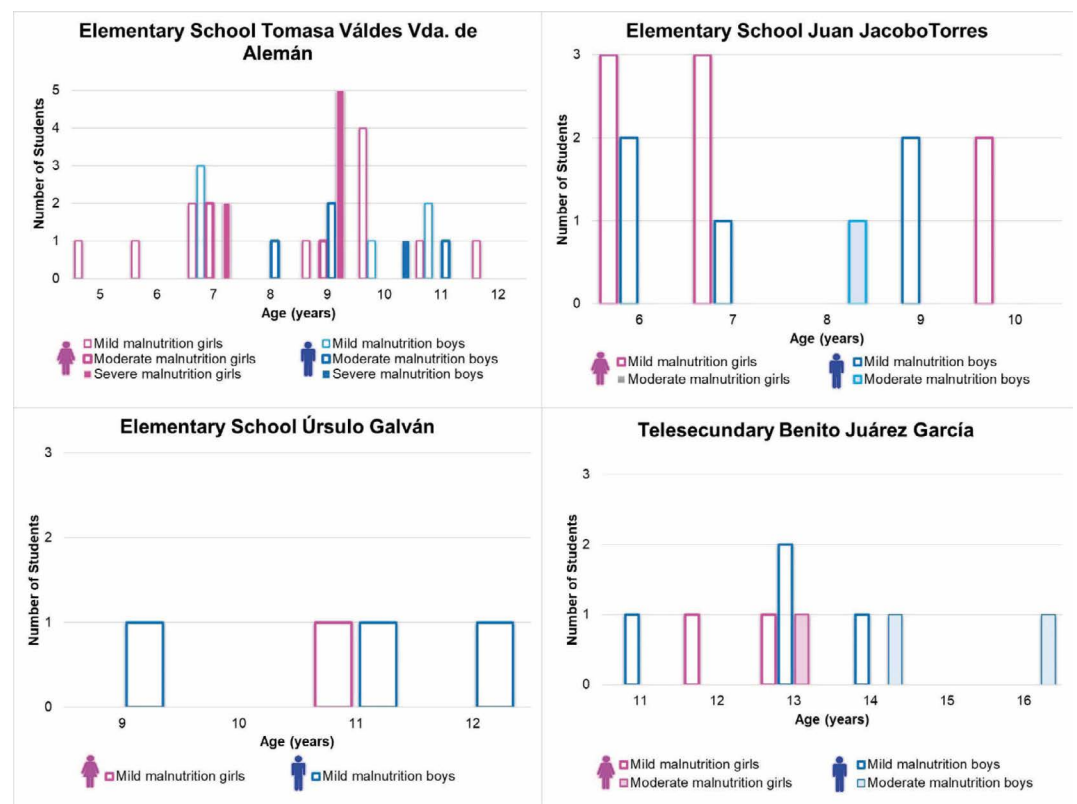


Figure 4. Distribution of students with indicators of malnutrition (mild, moderate, and severe), according to age and gender.

continue to exist, but on an even larger scale, depending on the cultural, economic, social, geographical, and political situation of society (Rodríguez *et al.*, 2018). According to UNICEF (2011), this problem may be rooted in the insufficient food intake (both in quantity and in quality), the lack of health care, the use of unsanitary water and sanitation systems, and poor care and eating practices.

CONCLUSIONS

The results of the anthropometric assessment show a higher incidence of overweight and malnutrition in girls, unlike boys, who present more cases of obesity. Based on the previous evidence, the Tomasa Valdés Viuda de Alemán elementary school has the highest population with malnutrition problems. However, the other three schools are not spared from this phenomenon. At recess, children engage in an excessive intake of ultra-processed foods with high caloric content and low nutritional value; this indicates that the situation is probably caused by an unbalanced diet coupled with a sedentary lifestyle.

These results allow us to determine the relevance of the problem and to seek alternatives in order to improve food and nutrition security conditions for children and teenagers. The said alternatives should be coupled with a transdisciplinary intervention with a bottom-up approach, based on participatory action research (PAR). An alternative aimed to improve these conditions is the creation of school kitchen gardens, which constitute an educational strategy to fight hunger and poor eating habits, in addition to being an initiative that is legally grounded at the international level by FAO (2005). In practice, these may be spaces where agro-ecopedagogy plays an important role in the improvement of food security conditions and the protection of the environment through a sustainable management of natural resources. Finally, we propose the elaboration of healthy menus based on school kitchen garden and regional products, in addition to encouraging physical activity. Teachers, parents, and students should be involved in this process in order to promote proper eating habits.

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